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UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF ENTOMOLOGY

FOREST INSECT INVESTIGATIONS

ANNUAL INVESTIGATIVE REPORT FOR 1935

AND PROGRAM FOR 1936

Forest Insect Laboratory
Fort Collins, Colorado

March 12, 1936.

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J.A. Beal

U. S. Forest Insect Laboratory,
Fort Collins, Colorado,
March 12, 1936.

Dr. F. C. Craighead,
Bureau of Entomology and Plant Quarantine,
Washington, D. C.

Dear Dr. Craighead:

I am enclosing our annual investigative report for 1935 and program for 1936 just as we have prepared it for the investigative committee meetings which are to be held here in Fort Collins sometime late this month. These have not yet been discussed or approved by the committee and they may be some changes made before the project sheets are included in the final mimeographed report of the Rocky Mountain Forest and Range Experiment Station. However, it has been my experience that investigative committees have very few if any recommendations to make.

The biggest change which is likely to occur in our program is of course with the Shelterbelt projects after July 1. However, since we do not yet know for certain the outcome of this project I have gone ahead and listed our shelterbelt projects assuming that this work would be continued.

cc to:
Mr. Miller
Mr. Evenden
Mr. Keen

Very sincerely yours,

J. A. Beal,
Entomologist,
Forest Insect Investigations.

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FOREST INSECT INVESTIGATIONS

(Division of Forest Insects, U.S.Bureau of Entomology & Plant Quarantine)

General

In January 1935 the Division of Forest Insects established a new western laboratory which is now located at Fort Collins, Colorado and associated with the Rocky Mountain Forest and Range Experiment Station. The territory which this laboratory serves includes: All of Region 2, the south half of Region 4, certain specified parts of Region 3, and all of the Plains Shelterbelt Region. Approximately one half of our laboratory funds for the year have come from allotments through the Shelterbelt Office. The Denver Regional Office has given material and financial assistance on some of the bark beetle problems by assigning entomologists to some of the laboratory projects. Following are the projects which have been undertaken during the year.

Project: Bark Beetle Surveys.

Scope: The object of the bark beetle surveys is to furnish information on the location and severity of outbreaks in the forest areas of the region. This information is best obtained through general reconnaissance surveys coupled with more intensive strip surveys in timbered areas where a threatening situation exists. The establishment of large permanent sample plots (at least one half section in size) in susceptible pine stands, for annual cruising of insect losses would aid materially in increasing our knowledge of bark beetle outbreaks and their causes.

Status: During the past year this project was confined largely to a survey of the Black Hills beetle infestation in the Elk Mountain area and the Medicine Bow National Forest, with some check-up on areas near the Uncompahgre and Montezuma National Forests. Five semi-permanent strips (1 by 80 chains) were laid out in the Elk Mountain area, just north of the Medicine Bow National Forest, the boundaries painted and the study plots cruised for past and present bark beetle losses.

Future Work: It is proposed to continue the survey in the Elk Mountain area this year to determine the trend of the epidemic now in progress. The Laramie Peaks area should be surveyed this year to determine the status of an infestation reported in this area. It would be advisable to establish the study plots over much of the pine region this year and thereafter have them cruised jointly by one man from this office and one or two local forest officers. This procedure would serve to familiarize both parties with the most important local insect problems. Definite action will necessarily depend upon the availibility of men and money for the work.
Date of Completion: Indefinite, probably continuous.
Assignment: J. A. Beal and J. M. Whiteside.

Project: Black Hills Beetle Studies.

Scope: These studies are designed to furnish information on life history, seasonal history and habits of the Black Hills beetle (Dendroctonus ponderosae Hopk.). Also to furnish information on host selection, and the cause and control of epidemics. Studies are being conducted with different host trees at several elevations, sample plots are being periodically cruised, and general observations made throughout the region. By caging portions of infested standing lodgepole pine and limber pine, and making weekly collections, records of comparative emergence, and duration of emergence, as well as data on associated insects are obtained. This information has a very practical application since it will assist in determining when control is necessary and the effective time for control operations.

Status: A series of cages have been placed on both lodgepole pine and limber pine at three elevations on Elk Mountain in southeastern Wyoming, at 8,000 feet, at 9,000 feet, and at 10,000 feet elevation. Fifteen cages, each covering two square feet of bark surface, have been used at each elevation. Periodic collections have been made from these cages and some valuable data obtained. A progress report on this phase of the study has already been prepared.

Future Work: During the coming summer and before emergence starts it is planned to place additional cages on infested trees in other parts of Region 2 for comparative emergence data and life history records. It is also planned to continue the Elk Mountain caging studies and to install more cages where needed. Periodic collections will be made from all cages. With the acquisition of refrigeration apparatus this project will be enlarged by the addition of a study on the effects of low winter temperatures on survival of the over-wintering broods of the Black Hills beetle.

Date of Completion: Indefinite.

Assignment: J. A. Beal and J. M. Whiteside.

Project: Studies on Ips Damage in Thinning Areas.

Scope: This project includes the obtaining of information on the amount of damage caused by Ips bark beetles following thinning operations, and conditions under which losses occur, with the object of devising methods of control if such measures are needed. Periodic examinations are made in thinned areas to obtain pertinent data, and studies are conducted on the habits of the beetles and possible control measures.

Status: These studies have been limited to ponderosa pine thinning areas in the Black Hills, involving damage by Ips oregoni Eichh. Although losses have increased annually during the three years of thinning, and have occurred under a variety of conditions, the present damage is probably not serious enough to warrant intensive control work. The Forest Service assigned an E.C.W. entomologist to assist in the studies during September and October, 1935. It was found that Ips oregoni Eichh. gradually abandons the slash during the fall, emerging from late September to early December for hibernation in the litter and duff. This habit precludes the application of control during the winter. Preliminary tests with partial peeling indicated that the leaving of strips of bark not over two inches wide would prevent the development of the beetle in slash thus treated.

Future Work: The periodic examinations of thinned areas in the Black Hills will be continued; the more detailed studies on beetle habits will be continued if finances permit.

Date of Completion: One season following the completion of thinning operations.

Assignment: L. G. Baumhofer.

Project: Studies on Insects Affecting Pine Plantations and Nurseries.

Scope: Several insects destructive to pine in the plantations and nursery in the Nebraska National Forest, near Halsey, Nebraska, have been studied to determine possible means of control. This work includes observations on the life history of the pests, followed by control tests based on the habits of the insects. Studies on parasitism and the possibility of introducing parasites have also been included. Tree plots have been established to determine the susceptibility of different species of pine at various ages and the effect of damage on growth. The progress of the infestations are also followed by taking annual records on these plots.

Status: This project has been under way for a number of years. With the following insects studies have been made in some detail and control measures either applied or tested experimentally: The midwestern pine tip moth (Rhyacionia frustrana bushnelli Busck), the southwestern pine tip moth (R. neomexicana Dyar), the pitch moth (Dioryctria ponderosae Dyar), and the white grubs (Phyllophaga spp.). A parasite introduced from Virginia, for the midwestern pine tip moth, gave good control for several years and resulted in a marked increase in height growth of the trees. Work on the project during the 1935 season was limited largely to the collection of data in some of the field and experimental nursery plots.

Future Work: The plot examinations will be continued and observations made on the progress of the introduced parasite. Some additional experimental control will be carried on for the southwestern pine tip moth.

Date of Completion: Indefinite.

Assignment: L. C. Baumhofer.

Project: Technical Assistance on Insect Control Projects in the Forested Region.

Scope: While this work can hardly be called a study project it is a very definite part of the duties of the laboratory personnel and as such should probably be listed here. It usually takes the form of a general survey or inspection of questionable areas in company with a forest officer and is made for the purpose of determining the need for control operations. Recommendations regarding control are usually based upon the joint findings. These inspections are not limited to National Forest areas but are also made on Indian Service lands, National Parks, and private holdings.

Status: During the past year such inspections were made and advice given on insect conditions and control projects on the Medicine Bow, Black Hills, Harney, Nebraska, Uncompahgre, and Montezuma National Forests in Region 2; on the Wasatch, Ashley, Uinta, and Dixie Forests in Region 4; on the Rosebud and Pine Ridge Indian Reservations; and on the Colorado National Monument, Timpanogos Cave National Monument, and Mesa Verde National Park; and the Elk Mountain area in Wyoming.

Future Work: Similar inspections will be made as requested by the various land managing agencies.

Date of Completion: Continuous.

Assignment: J. A. Beal and L. G. Baumhofer.

Project: Experiments with Control of Tree Borers.

Scope: This project includes the testing of several chemicals for their insecticidal qualities against borers in living trees in the Plains States. Its object is to provide a method of protecting shelterbelt plantings from borer damage. In these experiments the insecticides are applied with a sprayer. After the chemical has had ample time to work, the treated trees are cut and the borer larvae examined to determine the mortality as compared to normal mortality in untreated trees. Additional trees are treated but left standing for later examinations, to determine the effect of the chemicals on the trees.

Status: Preliminary tests with several chemicals against the carpenter worm (Prionoxystus robiniae Peck) and Tylonotus bimaculatus Hald., in an old green ash tree-claim near Broken Bow, Nebraska, were carried out during September and October, 1935. One of the chemicals, a transparent penetrating creosote, gave some promising results against the borers even with this late season treatment.

Future Work: Promising insecticides will be tried during midsummer when the temperatures are higher and the insects more active. These tests should be made against several species of borers both in the northern and southern parts of the Shelterbelt Region. Paper barriers on the base of young cottonwood, to prevent attacks by the cottonwood borer, will also be tested in Kansas and Oklahoma.

Date of Completion: Indefinite.

Assignment: N. D. Wygant.

Project: Biology and Control Studies of Acorn Weevils.

Scope: The aim of this study is to develop a means of controlling the weevil injury to acorns collected for shelterbelt planting in on the Great Plains. Several fumigants, such as carbon disulphide, will be tested at different dosages against the weevils soon after the acorns are collected. Part of these treated acorns, along with untreated seed, will be stored according to standard practices and later planted to determine the results of fumigation on seed viability. The remaining portion of the treated acorns will be opened a few days after fumigation for mortality counts on the weevil larvae.

Status: This is a new project to be started during the field season of 1936.

Future Work: Each of five shelterbelt states will furnish adequate samples of burr oak acorns, two states will furnish post oak acorns, and two states will supply live oak acorns, and will send them to Lincoln, Nebraska, at the time of collection, where they will be treated and a portion later planted in one of the shelterbelt nurseries. Life histories and habits of weevils infesting the acorns will be studied to determine whether or not control measures might be applied in the field.

Date of Completion: Indefinite.

Assignment: M. D. Wygant.

Project: Studies on Control of Termites in Nurseries.

Scope: The object of these studies is to discover means of preventing or controlling termite injury to seedlings in the southern nurseries. Soil fumigants such as carbon disulphide, orthodichlorbenzene, and paradichlorbenzene are applied to the infested areas and the effect on both termites and seedlings determined. Various cultural measures such as heavy irrigation and the removal of all old organic material from the nursery site may aid in decreasing the infestations.

Status: Preliminary tests with paradichlorbenzene crystals, and with emulsions of orthodichlorbenzene and of carbon disulphide, against Reticulitermes tibialis Banks in a nursery near Oklahoma City, during late September, appeared to be effective without apparent injury to the seedlings. Termite damage was heavier in a nonirrigated area than in the irrigated portion of the nursery. Heavy irrigation, however, is not advisable for certain species of seedlings because of the resulting excessive growth.

Future Work: These insecticides are to be tried against the termites on a larger scale. The effect of the chemicals on younger seedlings of various species will also be tested in several types of soil.

Date of Completion: Indefinite.

Assignment: N. D. Wygant and J. A. Beal.

Project: Studies on Control of White Grubs.

Scope: The purpose of this project is to develop control measures and to study the habits of white grubs (*Phyllophaga* spp.) in forest seedling nurseries. Sampling new or infested nursery sites for grub abundance will aid in eliminating the most heavily infested areas from planting. Soil fumigants such as carbon disulphide will be tested, since they offer the best possibilities for control in nurseries where the seedlings are already established.

Status: Limited studies on white grub control have been carried on in the Bessey Nursery, near Halsey, Nebraska, for several years. Arsenic treated plots in this nursery have indicated that the arsenic will remain in the soil for a period of years and is not safe to use in seedling nurseries. Crude white arsenic, at dosages insufficient to kill the grubs, caused injury to pine transplants five years after application. A few preliminary tests with carbon disulphide emulsion as a soil fumigant caused no apparent injury to pine and hardwood seedlings after midsummer.

Future Work: The more promising soil fumigants will be tested in several soil types, and their effect on various species of seedlings at different ages determined. A survey of white grub population in the heavily infested nursery at Baltic, South Dakota, will be made in the spring, to decide which portions of the nursery should be left unplanted. Similar white grub surveys will be made, preferably in the fall, on other sites where such information is needed.

Date of Completion: Indefinite.

Assignment: M. D. Wygant and L. G. Baumhofer.

Project: Technical Assistance on Insect Control in the Shelterbelt Region.

Scope: This work is designed to aid the field men in handling their insect control problems. Although not strictly a study project it is a service which requires a considerable portion of the time of the laboratory personnel. This work also furnishes an opportunity to try out improved methods of control which have not been previously been tested. General examinations are made in company with the nurserymen or other shelterbelt personnel and recommendations, advice, or assistance given on control.

Status: During the past year shelterbelt nurseries reporting serious insect damage were visited and examined. Control was advised where needed. Similar service was given on many of the shelterbelt strips. The more important insects encountered on these inspections were as follows: Cutworms, grasshoppers, termites, white grubs, wood borers, aphids, flea beetles, blister beetles, sphinx moth larvae and a number of other defoliating caterpillars.

Future Work: This inspection service, including technical assistance and recommendations, will be continued as requested by field men in charge of protecting trees in the shelterbelt nurseries and strips. It will cover, as in the past, all six states in the Shelterbelt Region.

Date of Completion: Continuous.

Assignment: J. A. Beal, L. G. Baumhofer, and N. D. Wygant.